

1969

**OPERATING
SUMMARY**

STRATFORD

water pollution control plant

LIBRARY COPY

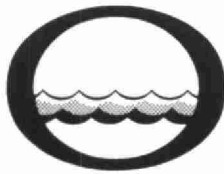
MAR 25 1971

ONTARIO WATER
RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

LABORATORY LIBRARY
ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations



Water management in Ontario

Ontario
Water Resources
Commission


135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.


D.S. Caverly,
General Manager.


D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

C O N T E N T S

Title page.	1
Flow diagram	2
Design data	3
'69 Review	4
Project costs	6
Process data	9

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

D. J. Collins

VICE-CHAIRMAN

J. H. H. Root, M. P. P.

COMMISSIONERS

H. E. Brown

D. A. Moodie

L. E. Venchiarutti

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

I. E. Overs

K. H. Sharpe

F. A. Voegel

A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

Director

D. A. McTavish

Assistant Director

C. W. Perry

Regional Supervisor

A. C. Beattie

Operations Engineer

B. W. Hansler

135 St. Clair Avenue West

Toronto 7

STRATFORD
water pollution control plant

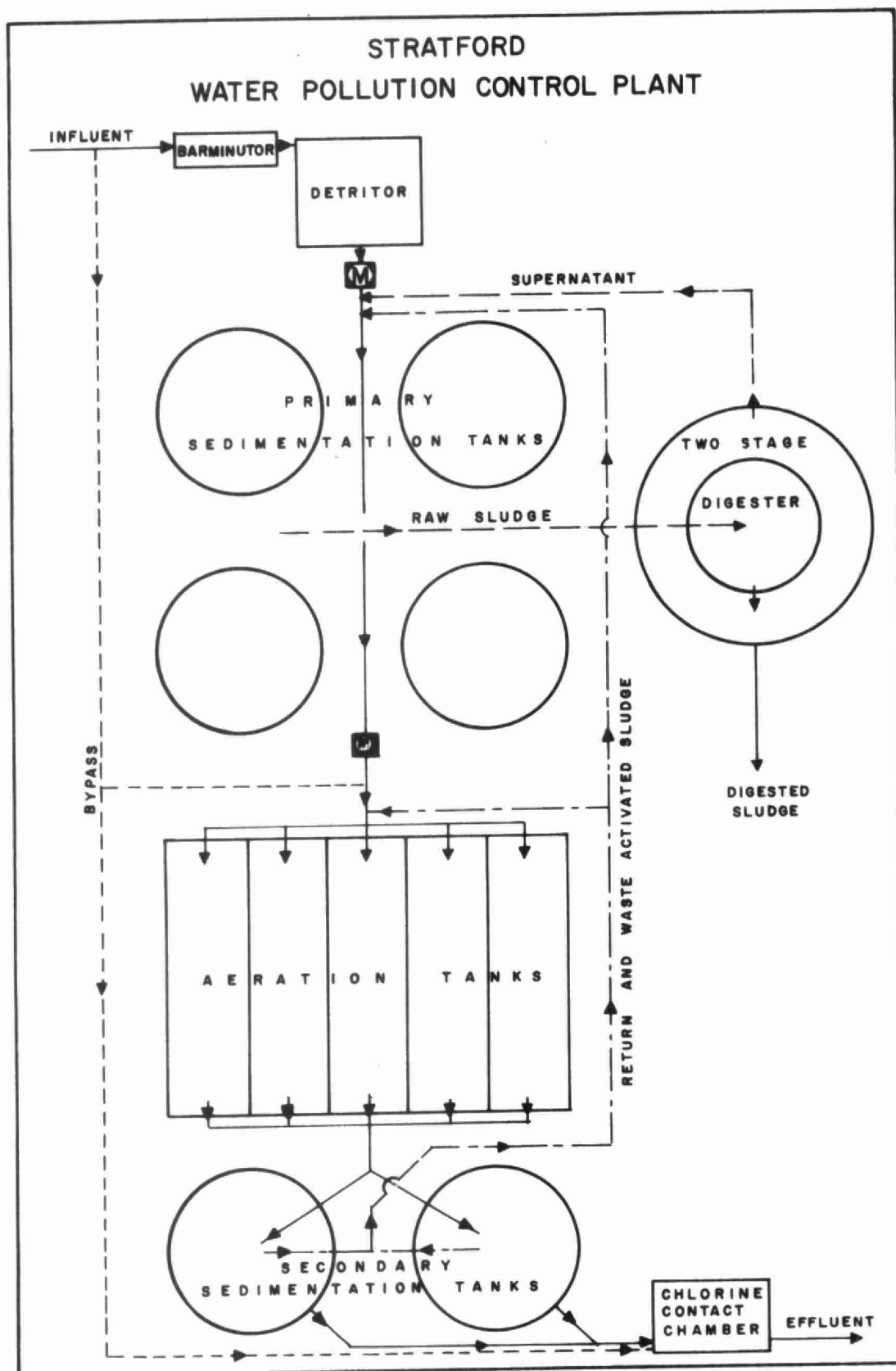
operated for

THE CITY OF STRATFORD

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY



DESIGN DATA

PROJECT NO.	2-0002-57	TREATMENT	Activated Sludge
DESIGN FLOW	6.0 mgd	DESIGN POPULATION	30,000
BOD - Raw Sewage	140 mg/l	SS - Raw Sewage	250 mg/l
- Removal	90%	- Removal	95%

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: One Model C (36")

Grit Removal

Type: Dorr detritor
Size: One 20' x 20' x 1' (2,500 gal)
Retention: 0.9 min

Primary Sedimentation

Type: Infilco
Size: Four 80' dia x 10½' swd (1.32 mil gal)
NOTE: Two used for storm flows only
Retention: 2.7 hr (2 cl)
Loading: Surface, 600 gal/ft²/day
Weir, 12,000 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; triple-pass
Size: Five 85½' x 25' 8" (avg) x 13' (0.97 mil gal)
Retention: 3.9 hr

Diffusers

Type: Activated Sludge Ltd.
Alundum Domes

Air Supply

Type: Roots-Connersville
Size: Three 1750 cfm

Secondary Sedimentation

Type: Infilco
Size: Two 80' dia x 11' 3" swd (0.705 mil gal)
Retention: 2.7 hr
Loading: Surface, 600 gal/ft²/day
Weir, 12,000 gal/ft/day

CHLORINATION

Chlorine Contact Chamber

Size: 67' x 27' x 8' (90,000 gal)
Retention: 22 min

Chlorinator

One F & P 500 lb/day

OUTFALL

- to Avon River

SLUDGE HANDLING

Digestion System - Heated, two-stage

Type: Gas mixed
Size: One 73' dia x 26' swd (100,000 cu ft or 0.624 mil gal)

Primary Stage (inner)

Size: 67,600 cu ft
Loading: 2.8 lb/cu ft/mo

Secondary Stage (outer ring)

Size: 32,400 cu ft
Total Loading: 1.9 lb/cu ft/mo

'69 REVIEW

GENERAL

During 1969 a total flow of 1,322.5 million gallons was treated at a cost of \$75,996.47 or \$57.46 per million gallons, compared with \$56.30 in 1968. The total flow in 1969 of 1,322.5 million gallons was an increase of 7.3% from 1968. The cost of BOD removed was six cents a pound.

The consulting engineer has submitted a proposal for expansion of the plant and it is expected that plans will be finalized in 1970.

PLANT FLOWS and CHLORINATION

In 1969, the plant's average daily flow of 3.6 mil. gal. was 60% of the design flow of 6.0 mgd. The flow was as low as 1.1 mgd and higher than 11 mgd during the year, but the plant's capacity was exceeded only 9% of the time. In 1968, the design flow of 4.0 mgd was exceeded 40% of the time.

Despite the increase in flows, the amount of grit removed was 40 cu. ft. per month. The average dosage rate required to produce a chlorine residual of 0.5 milligrams per litre after 15 minutes' contact was 1.7 mg/l.

PLANT EFFICIENCY

The average raw sewage strengths of 113 mg/l for BOD and 172 mg/l for

suspended solids showed a substantial decrease from 1968 strengths of 282 and 232 mg/l respectively. Raw sewage BOD loading exceeded the design loading 19% of the time, while suspended solids loading exceeded design 11% of the time.

Reductions of 92% BOD and 93% suspended solids were experienced in 1969 compared with 95% for each in 1968, bringing the final effluent well within the OWRC objectives.

Average final effluent BOD and suspended solids concentrations were 9 and 12 mg/l, lower than the OWRC objectives of 15 mg/l for each. These objectives were exceeded 5% of the time for BOD and 25% of the time for suspended solids.

SLUDGE DIGESTION

The volatile solids reductions was 29.4%, 0.4% higher than in 1968. The total solids concentration in the raw sludge of 7.0% was slightly higher than that of the previous year. The digester sludge total solids concentration in 1969 was 6.1%, slightly higher than 1968.

A total of 13,977 cubic yards of sludge was disposed of during 1969.

CONCLUSIONS

The plant produced an excellent effluent with BOD and suspended solids concentrations below the OWRC objectives.

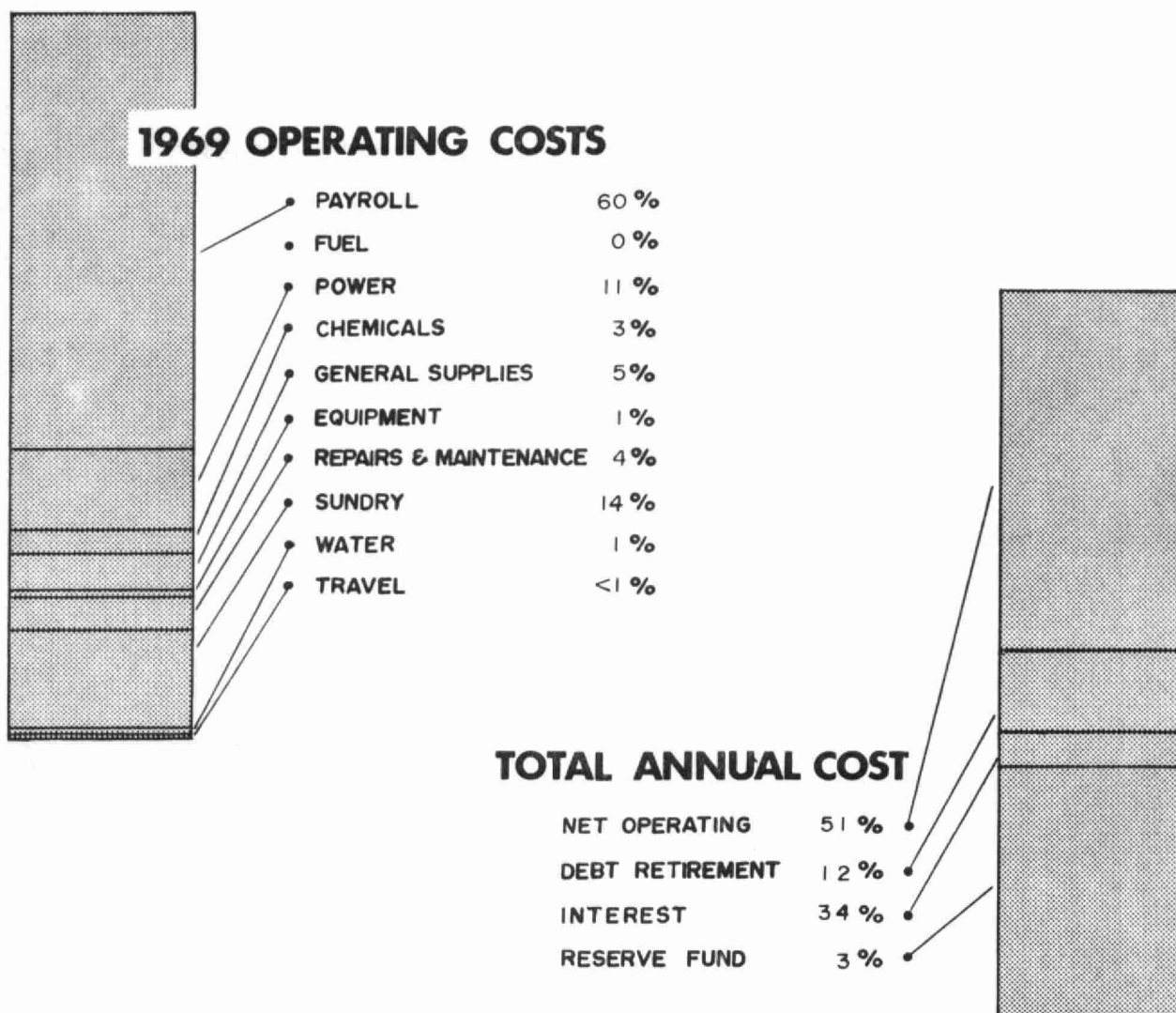
Average daily flows of 3.38 million gallons were approximately the same as in 1968.

PROJECT COSTS

NET CAPITAL COST (Final)	\$925,309.42
DEDUCT - Payments from Municipality	<u>309.42</u>
Long Term Debt to OWRC	<u>\$925,000.00</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	<u>\$279,787.87</u>
Net Operating	\$ 75,996.47
Debt Retirement	18,667.00
Reserve	3,716.53
Interest Charged	<u>51,785.99</u>
TOTAL	<u>\$150,165.99</u>

RESERVE ACCOUNT

Balance @ January 1, 1969	\$ 76,657.25
Deposited by Municipality	3,716.53
Interest Earned	<u>4,423.47</u>
	\$ 84,797.25
Less Expenditures	<u>352.15</u>
Balance @ December 31, 1969	<u>\$ 84,445.10</u>



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	1142.5	\$57,079.98	\$49.96	3 cents
1966	1120.8	59,148.93	52.77	2 cents
1967	1586.6	65,593.65	41.37	2 cents
1968	1232.1	69,371.20	56.30	2 cents
1969	1322.5	75,996.47	57.46	6 cents

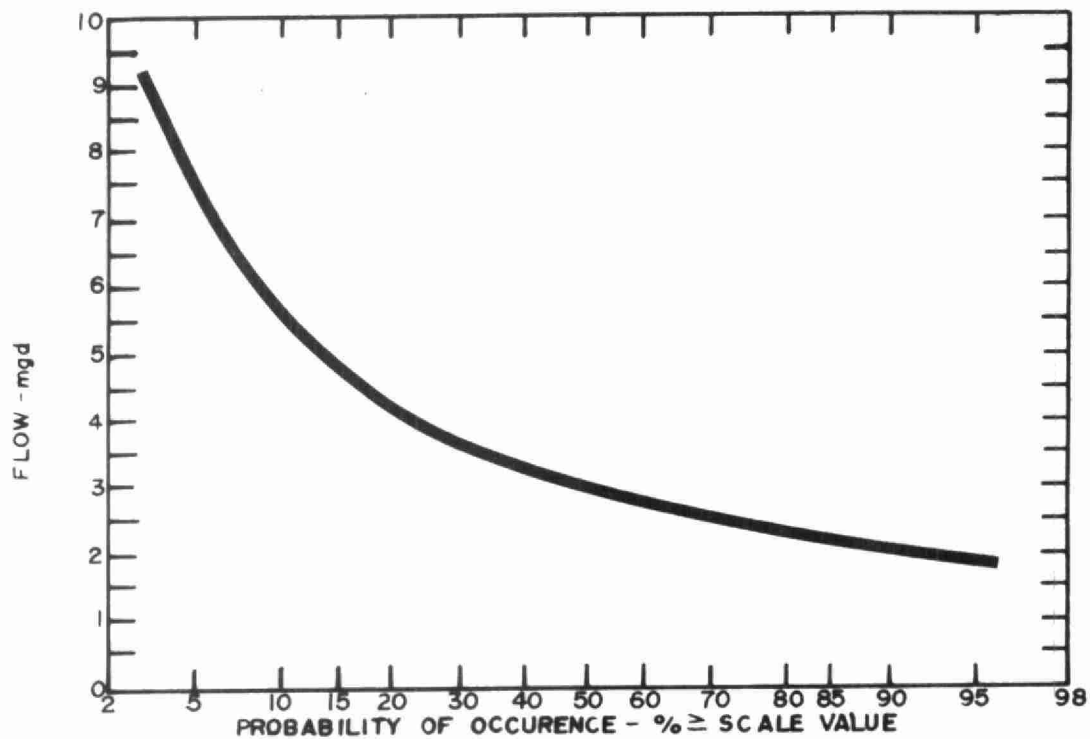
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	6031.36	4915.57	-	-	741.88	-	29.03	-	259.54	23.24	53.40	8.70
FEB	7525.69	3264.47	-	-	808.68	2131.50	202.55	38.85	295.98	718.41	53.40	11.85
MAR	5609.57	3251.44	-	38.26	684.28	-	249.29	-	109.95	1212.30	53.40	10.65
APR	5204.45	3389.09	-	-	639.08	-	269.07	449.99	-	393.47	53.40	10.65
MAY	5842.00	3711.70	158.26	(38.26)	725.88	-	405.73	101.90	109.56	604.67	53.41	9.15
JUNE	6980.27	3936.56	364.24	-	635.08	-	441.88	-	44.47	1484.33	53.41	20.30
JULY	5596.49	3388.50	125.02	-	625.88	101.72	286.73	-	142.13	773.36	53.41	99.74
AUG	7328.80	5028.74	297.95	-	666.28	-	261.70	-	-	920.72	53.41	-
SEPT	5708.77	3383.73	239.69	-	636.28	-	489.64	-	65.38	819.49	53.41	21.15
OCT	6132.67	3503.33	-	-	593.35	-	641.09	-	343.57	898.62	53.41	99.30
NOV	4508.43	3365.59	-	-	634.95	-	234.23	54.22	57.24	95.44	53.41	13.35
DEC	9527.67	3189.88	-	-	1376.30	-	322.41	-	1777.62	2745.64	106.82	9.00
TOTAL	75996.47	44328.60	1285.16	-	8767.92	2233.22	3833.35	644.96	3205.44	10689.69	694.29	313.84

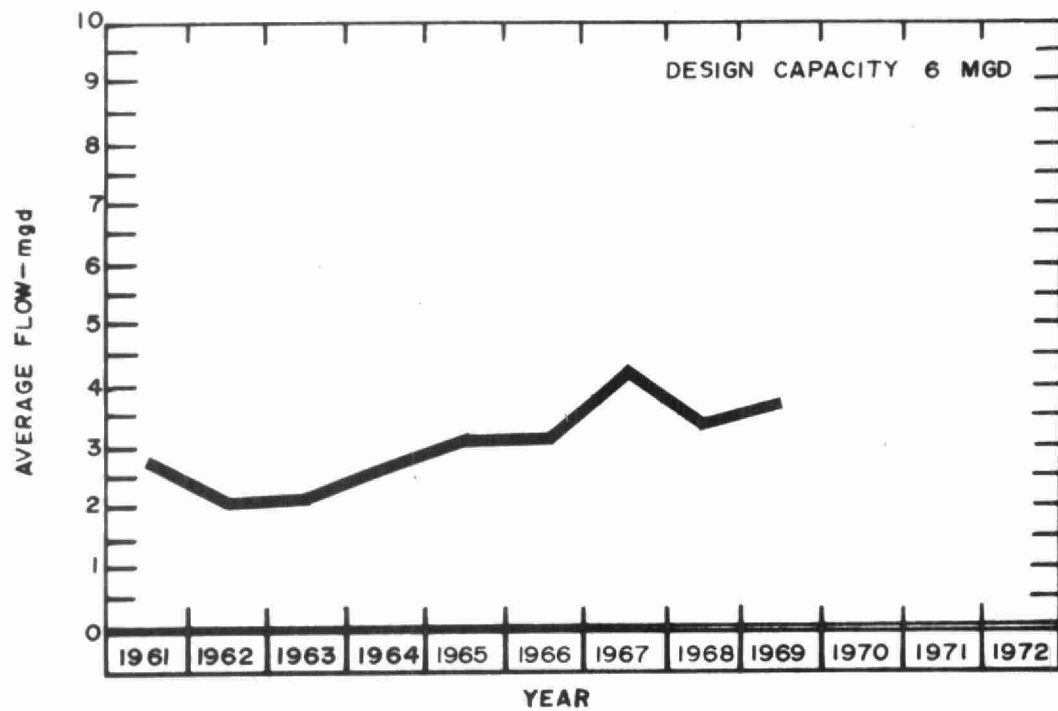
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$8905.47

PROCESS DATA

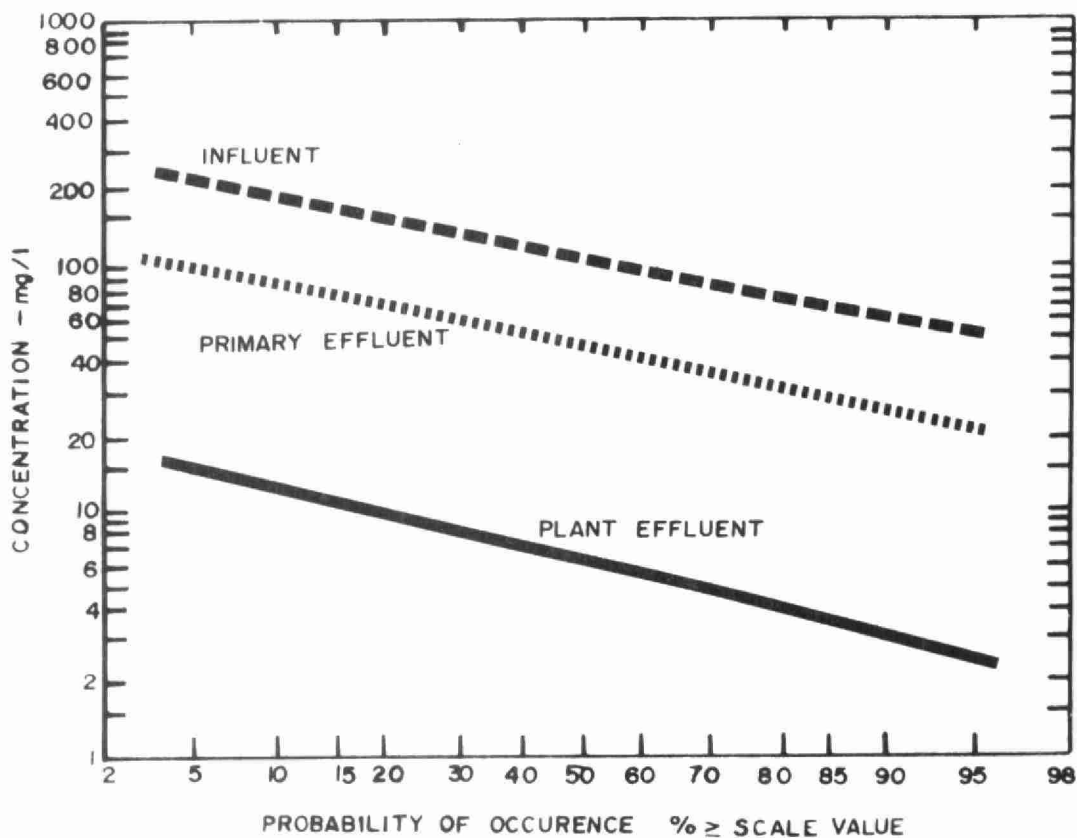


FL O W S

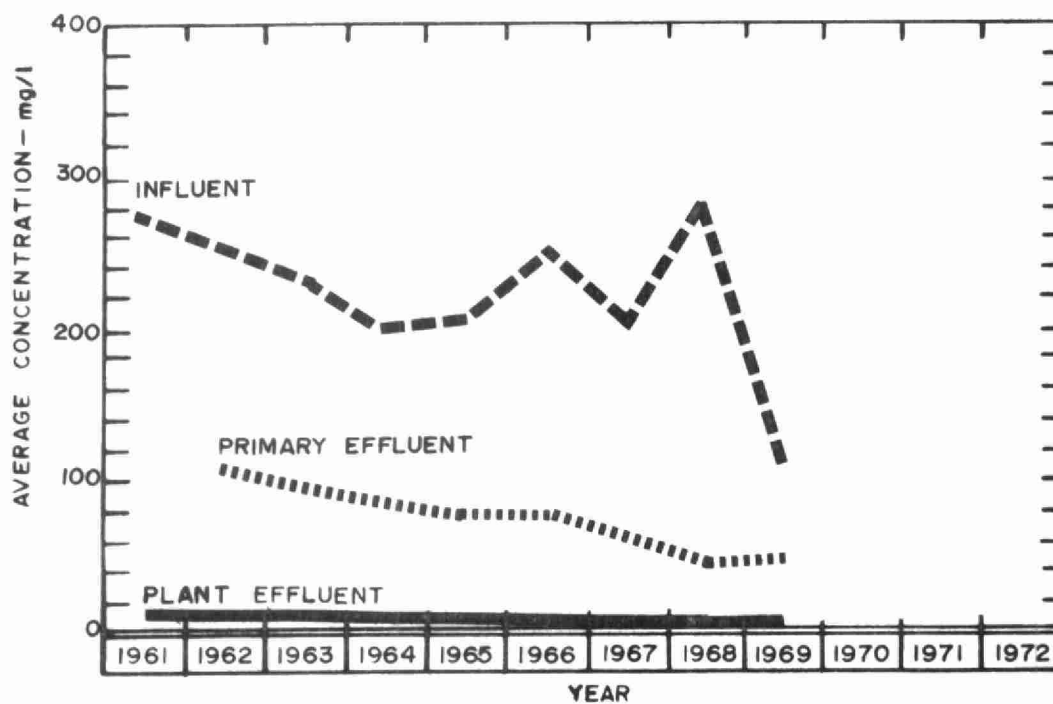


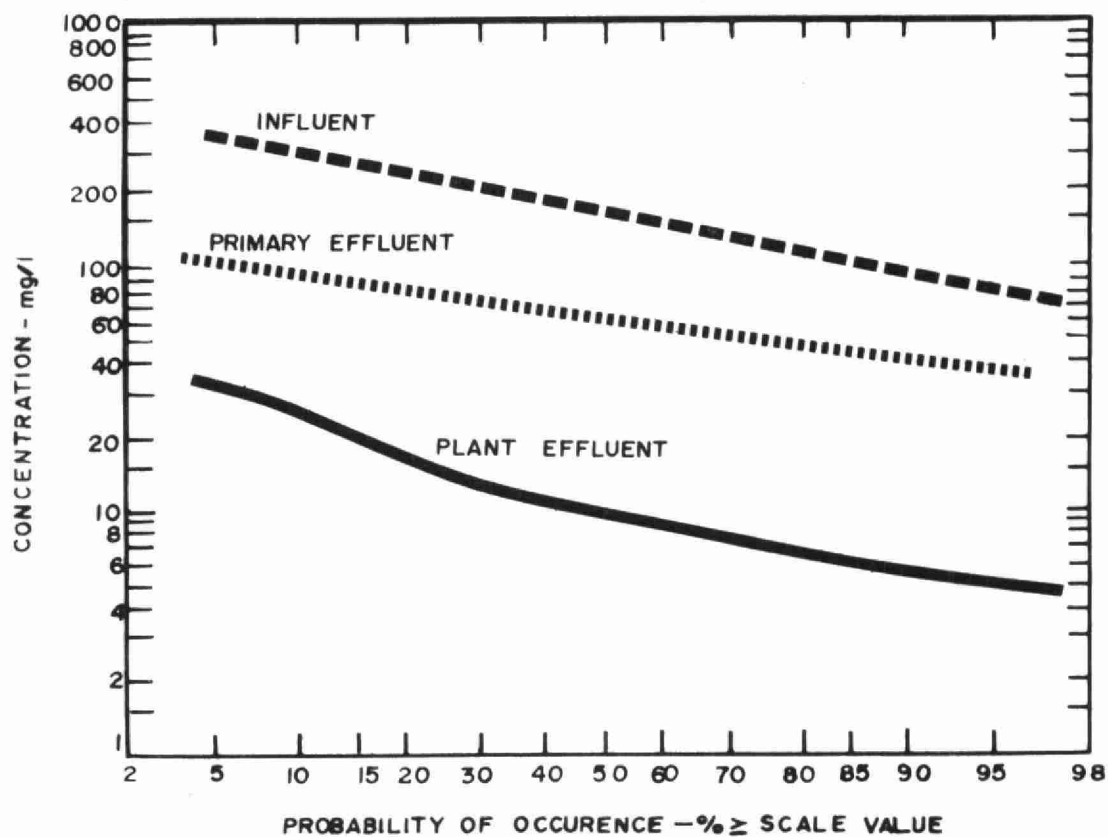
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF. mg/l	EFF. mg/l	REDUCTION		INF. CONCN mg/l	EFF. CONCN mg/l	REDUCTION		
			%	10 ³ pounds			%	10 ³ pounds	cu
JAN	83	7	92	90.	245	17	93	270.	82
FEB	95	25	74	60.	155	8	94	127.	51
MAR	140	5	96	225.	110	5	95	175.	26
APR	205	9	96	326.	245	13	95	386.	44
MAY	90	7	92	109.	120	15	88	138.	26
JUNE	95	5	95	96.	148	7	95	150.	18
JULY	75	5	93	64.	110	5	95	96.	40
AUG	60	8	87	46.	100	5	95	85.	70
SEPT	112	9	92	78.	130	13	90	89.	34
OCT	180	10	94	154.	400	33	92	332.	27
NOV	130	10	92	135.	160	10	94	168.	51
DEC	89	5	94	74.	140	10	93	114.	28
TOTAL	-	-	-	-	-	-	-	-	497
AVERAGE	113	9	92	121.	172	12	93	178.	41

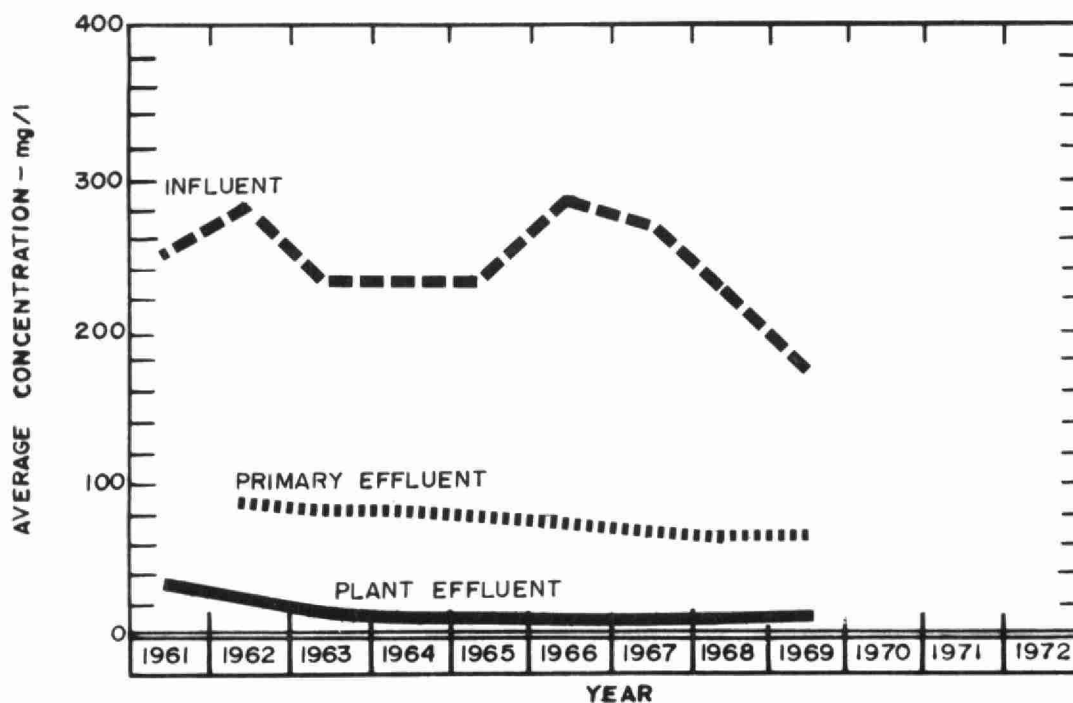


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS

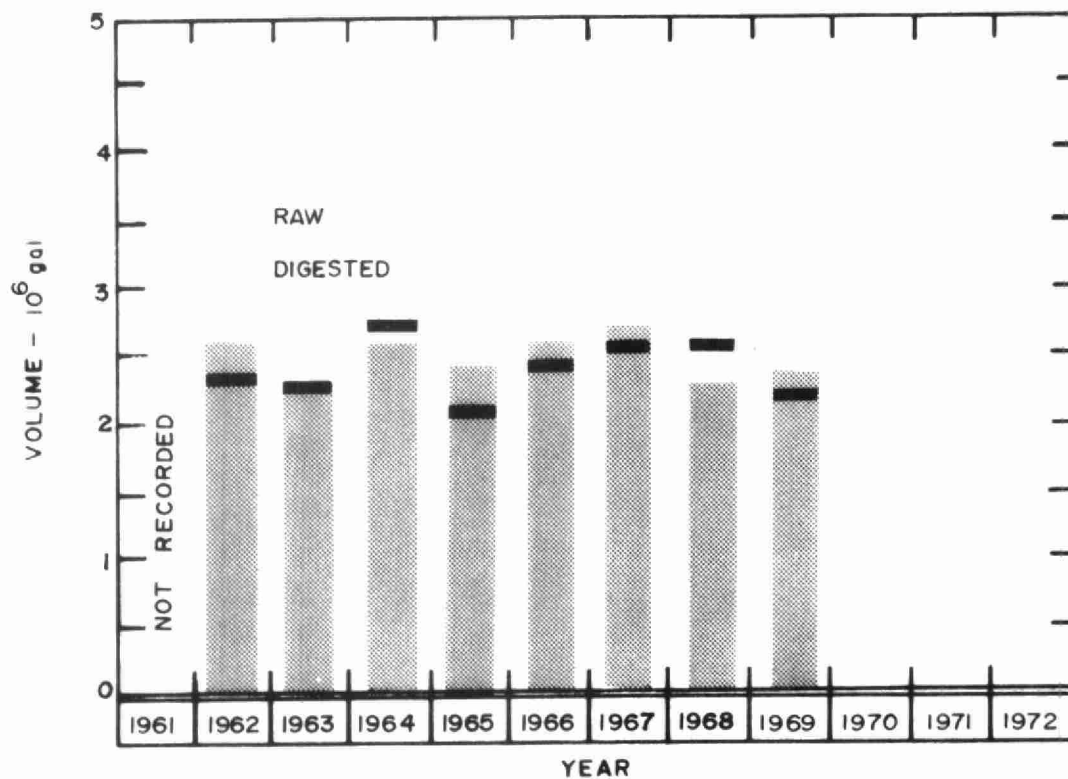


PLANT FLOWS and CHLORINATION

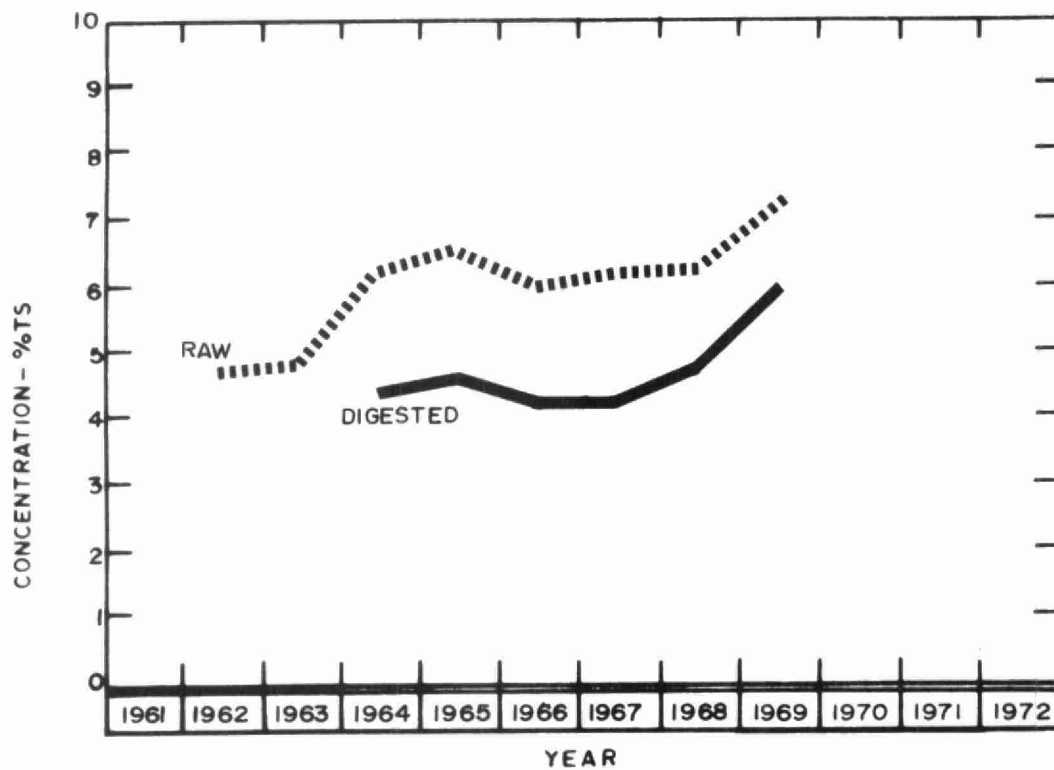
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	118.5	3.82	11.2	1.2	1.74	1.5
FEB	86.2	3.04	7.7	2.1	1.50	1.7
MAR	166.6	5.37	10.8	2.2	2.16	1.3
APR	166.4	5.54	10.4	3.3	2.04	1.2
MAY	131.2	4.23	9.5	2.1	1.96	1.5
JUNE	106.4	3.55	4.7	2.4	1.87	1.8
JULY	91.1	2.94	4.8	2.1	1.80	2.0
AUG	89.3	2.88	6.2	1.9	1.70	1.9
SEPT	76.2	2.54	3.6	1.1	1.64	2.2
OCT	90.4	2.91	4.8	1.6	2.01	2.2
NOV	112.2	3.7	8.8	2.2	1.97	1.8
DEC	88.0	2.8	4.3	1.9	1.82	2.1
TOTAL	1322.5	-	-	-	22.21	-
AVERAGE	-	3.6	-	-	1.85	1.7

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE 10 ³ pounds
		BOD	SS	BOD	SS				
		mg/l	CONCN mg/l	mg/l	CONCN mg/l				
JAN	3.21	65	65	7	17	2470	.09	1987	37.
FEB	3.03	58	65	25	8	2650	.07	1792	44.
MAR	4.85	60	80	5	5	2680	.12	1237	52.
APR	5.10	59	55	9	1	2360	.14	1215	43.
MAY	4.08	27	50	7	15	2560	.05	3546	61.
JUNE	3.53	34	43	5	7	2550	.05	2932	39.
JULY	2.93	45	70	5	5	2590	.05	2623	35.
AUG	2.81	42	65	8	5	2320	.05	3591	92.
SEPT	2.54	57	85	9	13	1870	.09	2789	.43
OCT	2.91	55	80	10	33	1660	.10	2826	27.
NOV	3.00	47	45	10	10	2250	.07	3372	36.
DEC	2.60	38	45	5	10	2120	.05	4340	40.
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	3.38	49	62	9	9	2340	.08	2688	46.



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	VOL SOLIDS	VOLUME	TOTAL SOLIDS	DEWATERED	LIQUID
	10 ³ gal	%	%	10 ³ gal	%	%	10 gal	%	cu yd	cu yd
JAN	209.	6.8	71	178.	4.2	63	-	-	0	1057
FEB	243.	7.6	72	267.	5.0	58	-	-	0	1568
MAR	179.	7.7	69	94.	4.8	60	-	-	0	546
APR	205.	7.4	61	120.	4.6	51	-	-	0	714
MAY	172.	7.1	70	233.	4.3	54	-	-	0	2009
JUNE	169.	7.0	74	166.	-	-	-	-	0	1043
JULY	171.	7.0	56	204.	18.0	63	-	-	0	1253
AUG	215.	7.6	61	186.	6.1	63	-	-	0	1106
SEPT	212.	5.9	71	208.	6.5	60	-	-	0	1218
OCT	221.	6.4	75	184.	3.9	62	-	-	0	1083
NOV	204.	6.9	72	165.	4.4	63	-	-	0	980
DEC	218.	6.1	74	236.	4.9	67	-	-	0	1400
TOTAL	2418.	-	-	2241.	-	-	-	-	0	13977
AVERAGE	202.	7.0	68	187.	6.1	60	-	-	0	1165

[illegible]



Water management in Ontario